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January 30, 1995

VIA HAND DELIVERY
William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: Comments of Millimeter Wave Advisory Group --
ET Docket No. 94-124

Dear Mr. Caton:

Millimeter Wave Advisory Group, hereby submits its Comments to the Commission's *Notice of Proposed Rule Making* issued in ET Docket No. 94-124, FCC 94-273 (released November 8, 1994).

Should you have any questions regarding these Comments, please contact the undersigned or Mr. Charles P. Mason, 3945 Freedom Circle, Suite 1100, Santa Clara, California 95054, telephone number (408) 653-3407.

Sincerely,

WILKINSON, BARKER, KNAUER & QUINN

By: Lawrence J. Movshin

Enclosure

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendments of Parts 2 and 15	)	ET Docket No. 94 - 124
of the Commission's Rule to Permit	)	
Use of Radio Frequencies Above 40 GHz	)	RM-8308
for New Radio Applications	)	
	)	

To: The Commission

Comments of Millimeter Wave Advisory Group To Proposed Rulemaking for Frequencies Above 40 GHz For New Radio Applications

January 30, 1995

I. Introduction

1. In its Notice of Proposed Rule Making (NPRM) adopted on October 20, 1994, the Commission proposed to open for commercial development and use a portion of the Millimeter Wave Frequency Bands above 40 GHz. It is our understanding that the proposals set forth in this NPRM are intended to encourage commercial products and services. We applaud this effort. In this response the Millimeter Wave Advisory Group addresses a number of important issues.

II. Millimeter Wave Advisory Group

2. The Millimeter Wave Advisory Group (mmWAG) [1] is a newly established industry forum whose purpose is to provide an exchange of industrial views on commercial applications in the above 40 GHz bands and to coordinate and cooperate in the utilization of these bands. The mmWAG was formed on November 10, 1994 during an organizational meeting in Palo Alto, CA.

3. The primary objectives of the group also include the identification of various applications in the frequency bands above 40 GHz, and to propose techniques such as spectrum etiquette for minimizing the probability of interference within each band.

III. General Comments

4. The mmWAG supports the goals of the NPRM and appreciates the balance between both licensed and unlicensed services. We also suggest that a thorough review of international activities and international compatibility be undertaken. We also support the establishment of the 40.5-42.5 GHz license band, and specifically support that larger service areas and longer license terms, as compared to those in the 28 GHz LMDS proposal, be adopted. We also suggest that there be no build-out restrictions.

5. We support the attached spectrum plan, listed in Table 1 below, as contrasted to the NPRM proposal. The primary differences are: (a) we suggest that each licensed service should be given at least 1 GHz of continuous spectrum for service flexibility, and (b) we suggest that only experimental licenses be authorized for the above 100 GHz bands until further proceedings when viable applications are fully understood. For the second point, we recommend that with the exception of the 152-154 GHz vehicular radar band, action should be delayed on rules for frequencies above 100 GHz until proposals for use are filed with the Commission. However, we urge very prompt action on frequencies below 100 GHz and in the 152-154 GHz band.

[1] The Millimeter Wave Advisory Group presently consists of Hewlett Packard Laboratories, TRW, and Hughes Research Laboratories. EDS Management Consulting Services, Wireless Industry Practice and Personal Telecommunications Technologies, Inc. are presently organizing the group effort.

Table 1: Frequency Band Allocation Proposal

Frequency Band	NPRM Proposal	mmWAG Recommendation
40.5 - 42.5 GHz	2 Licensed Bands	2 Licensed Bands
47.2 - 47.4 GHz	Vehicular Radar	Exclusive Vehicular Radar [a]
47.4 - 48.2 GHz	2 Licensed Bands	General Unlicensed Devices [b]
48.2 - 50.2 GHz	None	2 Licensed Bands [c,d]
56 - 58.2 GHz	None	Multiple Licensed Bands [d,e]
59 - 64 GHz	General Unlicensed Band	General Unlicensed Devices [b]
71 - 72 GHz	Half Licensed / Half Unlicensed	General Unlicensed Devices [b]
76 - 77 GHz	Vehicular Radar	Exclusive Vehicular Radar [a]
84 - 85 GHz	Half Licensed / Half Unlicensed	General Unlicensed Devices [b]
94.7 - 95.7 GHz	Vehicular Radar	Exclusive Vehicular Radar [a]
103 - 104 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only [f]
116 - 117 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only [f]
122 - 123 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only [f]
126 - 127 GHz	Half Licensed / Half Unlicensed	Experimental Licenses Only [f]
139 - 140 GHz	Vehicular Radar	Experimental Licenses Only [f]
152 - 153 GHz	Half Licensed / Half Unlicensed	Exclusive Vehicular Radar [a,g]
153 - 154 GHz	None	Exclusive Vehicular Radar [a,g]

Notes:

a. We recommend that vehicular radar applications have the exclusive use of these vehicular radar bands and use only these bands

b. We recommend that general unlicensed devices, excluding vehicular radar systems, can use these bands and only these bands so designated for unlicensed use.

c. We recommend that the Commission allocate the entire 47.2 - 50.2 GHz band, which is already designated for satellite and mobile applications, at this time.

d. We recommend that the Commission allocate at least 1 GHz for each license, in licensed bands, to allow system configuration and application design flexibility.

e. We recommend that the Commission allocate this lower portion of the Oxygen Absorption band for short range point-to-point broadband licensed applications. There is no known use or planned use of this band.

f. We recommend all bands above 100 GHz, excluding 152 - 154 GHz band, be authorized on an experimental license - basis only until viable commercial applications are fully understood.

g. We recommend 152 - 153 GHz band and an additional 1 GHz band of 153 - 154 GHz be allocated for exclusive vehicular radar applications to take advantage of the fact that these bands are the harmonic doubles of the planned 76 - 77 GHz vehicular band.

6. The mmWAG supports the proposed unlicensed vehicular radar bands as indicated, and in particular we feel that vehicular radar systems, licensed or unlicensed, cannot share a band with other applications. We recommend that rules must clearly state that vehicular radar systems have the exclusive use of these assigned bands and must reside in these assigned bands, and that all other bands are for other unlicensed applications and cannot be used by vehicular radar systems. For general unlicensed devices, the mmWAG suggests that the IEEE C95.1-1991 exposure standard is reasonable, and will not be a constraining factor in the design of Part 15 transmitters. For unlicensed devices, we recommend against interlocks. However, we feel that interlocks could be applied to tower-mounted licensed transmitters, if needed.

7. We further believe that the government and civilian users of the frequencies above 40 GHz can share the millimeter wave spectrum, and that government preemption of spectrum is unnecessary. However, we feel that the possible restriction due to government uses should be fully disclosed to the intended users.

8. The mmWAG recommends a spectrum etiquette approach for interference limitation among unlicensed devices. As in the past practices, we believe the Commission could speed up the rule making process by accepting appropriate industry input in establishing this etiquette. The mmWAG will fully support the Commission in this aspect. Finally, we recommend against mandatory susceptibility limits for Part 15 devices, feeling that poorly designed equipment will fail in the marketplace and that industry adopted voluntary susceptibility limits would be a much better approach.

IV. Specific Recommendations

IV.1 Unlicensed Automotive Applications

9. The mmWAG is fully aware of the effort undertaken by the American Automotive Manufacturer's Association (AAMA). The mmWAG will cooperate with AAMA regarding the spectrum allocation and maintenance of mutually exclusive use of vehicular radar bands and general unlicensed device bands.

10. As explained in the mmWAG's recommended spectrum allocation table, the mmWAG supports the exclusive use of vehicular radar devices in the designated vehicular radar bands and only in these bands.

11. The mmWAG recommends that the Commission not place any requirements on safety interlocks. This issue will be best addressed by systems and applications designers.

IV.2 Oxygen Absorption Band

12. There is increasing interest in the oxygen absorption band for new communications systems and services. The reasons are primarily threefold: (a) relatively new enabling technology for the 59 - 64 GHz band is now available, (b) foreign developments in this band are already underway, and (c) interest in broadband services is significant. The development in millimeter wave MMIC technology has also been substantial since the early 1990's.

13. The oxygen absorption band, because of its substantial absorption and attenuation characteristics,[2] is ideally suited for range limited communications. Other factors such as antenna noise temperature and broadcast loss vs. distance for 60 GHz are further range limiting factors of the oxygen absorption band. In addition, earth to satellite communication is not practical in the oxygen absorption band because of the significant attenuation in excess of 100 dB.

14. Studies in the UK under the RACE program as well as wireless communications in Germany and the Netherlands have already taken place. In addition, the Australian CSIRO millimeter wave LAN project is being conducted in the 60 GHz. band. Other countries are looking at the international allocation for 59 - 64 GHz. and are reviewing applications and experimental programs as well.

15. With the communications revolution and the interest in the information highway, communications services and high bandwidth, high speed applications may be available soon. Current ATM networks will start at 2.4 Gbps, but are likely to increase in speed. However, fiber is not always able to reach each and every user. Without high bandwidth wireless connectivity to these fiber systems, there will be a bottleneck on the information highway. It is therefore important to preserve this high bandwidth capability in the 59 - 64 GHz oxygen absorption band and not to carve it up into smaller segments.

16. Our proposal for the spectrum in the oxygen absorption band is to allow a combination of licensed services, radio physics utilization, and unlicensed type-approved devices. For unlicensed devices in this band, we recommend that they should be subject to strict type approval process per FCC rules and regulations, including a spectrum etiquette which this mmWAG intends to propose.

17. The mmWAG suggests that an EIRP limit of +10 dBW for general unlicensed devices in the 59 -64 GHz band is sufficient to limit range and interference.

18. We propose a general limit of +16 dBW for licensed services, but feel that licensed installations, with the exception of those in the proposed 56 - 58.2 GHz band, could be allowed to transmit up to +40 dBW with case-by-case approval.

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[2]Tolbert, C.W. and Straiton, A.W., 1964, "The attenuation and emission in the earth's atmosphere of the complex 60 GHz. oxygen lines" Research Report, University of Texas, Austin, NASA index 64N23145.

V. Millimeter Wave Advisory Group's Plan

19. The mmWAG intends to actively participate in the comment phases of the Commission's NPRM on above 40 GHz bands. The mmWAG will work closely with the Commission in the development of Spectrum Etiquette for general unlicensed bands. In addition, the mmWAG will actively work to address important commercial uses with its current membership and future participants.

VI. Conclusions

20. It is important for the Commission to move quickly in the below 100 GHz bands, especially the oxygen absorption band, in order to signal to industry and international bodies the importance of commercial applications in these bands. In addition, we would suggest that unfettered civilian and commercial development will in fact aid potential military and other governmental uses, because these research projects will result in communications systems with much reduced cost. Our vision of the future is to utilize these systems for broadband capabilities in concert with fiber and other information communications techniques, and that this is a public resource which must be used widely.

21. We appreciate the opportunity to comment on this NPRM. We will continue to provide assistance to industry and the Commission on this important matter throughout the rule making process.

Respectfully submitted,

Millimeter Wave Advisory Group

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